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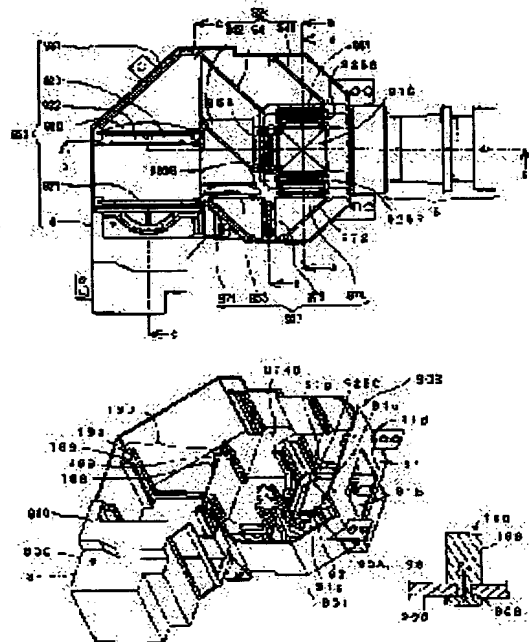
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## OPTICAL UNIT AND PROJECTION TYPE DISPLAY DEVICE

## Abstract:

**PROBLEM TO BE SOLVED:** To provide an optical unit and a projection display device which can be reduced in weight, improved in heat radiating performance and enhanced in reliability by improving the material of the applied member.

**SOLUTION:** In the optical unit 10 of the projection display device 1, a light source lamp unit 8, a color separation optical system and liquid crystal light valve 925R, 925G and 925B are incorporated in a lower light guide 901 of the light guide molding 900 consisting of a magnesium alloy which is light in weight, excellent in the property of radiating heat and further, with high strength. Optical components constituting the color separation optical system, etc., are arranged in a groove-like optical component positioning part 190 consisting of a resin part 199 molded by the outsert molding of the light guide molding 900 consisting of the magnesium alloy.



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AIMS

aim(s)]

- aim 1] Process optically the flux of light by which outgoing radiation was carried out from the light source section, the optical image corresponding to image information is formed. The color separation optical system which is an optical unit for the projection mold displays for carrying out expansion projection of this optical image on a projection through projection optical system, and separates into the flux of light of two or more colors the flux of light by which outgoing radiation was carried out from said light source section, Two or more light valves which modulate the flux of light of each separated color based on image information, The color composition optical system which compounds the modulation flux of light of each color modulated through this light valve, It has the projection optical system which turns to a projection side the modulation flux of light compounded by this color composition optical system, and carries out expansion projection. Said light source section, said color separation optical system, said light valve, said color composition optical system, and said projection optical system are an optical unit characterized by being supported by the light guide using the mold goods which consist of a Magnesium alloy.
- aim 2] The optical unit characterized by the head section for carrying said color composition optical system and said projection optical system in said light guide being constituted by one in claim 1.
- aim 3] The optical unit characterized by constituting the optic installation section equipped with the level difference carrying out positioning immobilization of the prism which constitutes said color composition optical system at said head section in claim 2.
- aim 4] The optical unit characterized by constituting the optic positioning section for carrying out positioning immobilization of the optic which constitutes said color separation optical system, or said light valve at said light guide in claims 1 or 2.
- aim 5] It is the optical unit characterized by consisting of resin parts united with the mold goods with which said optic positioning section consists of said Magnesium alloy in claims 3 or 4.
- aim 6] The resin part which constitutes said optic positioning section in claim 5 is an optical unit characterized by being formed by one shaping with the mold goods which consist of said Magnesium alloy.
- aim 7] A resin through hole is formed in the part in which said optic positioning section is formed in claim 6 among mold goods which consist of said Magnesium alloy. By solidifying, after resin flows said resin through hole to a background at the time of one shaping with the mold goods which consist of said optic positioning section and said Magnesium alloy The resin part which constitutes said optic positioning section is an optical unit characterized by being fixed to the mold goods which consist of this Magnesium alloy as sandwich the mold goods which consist of said Magnesium alloy.
- aim 8] The optical unit characterized by uniting with said light guide while being formed in claim 1 thru/or either of with the mold goods with which said head section and the groove optic positioning section consist of said Magnesium alloy.
- aim 9] The positioning section which positions a non-plate-like optic among said groove optic positioning sections in claim 8 is an optical unit which has the guide section which guides the side edge side of the optic concerned, and is characterized by the height dimension of this guide section being lower than the dimension of said non-plate-like optic.
- aim 10] The positioning section which positions one side face of a plate-like optic among said groove optic positioning sections in claim 8 is an optical unit which has the guide section which guides the side edge side of the optic concerned, and is characterized by the height dimension of this guide section being lower than the dimension of said plate-like optic.
- aim 11] It is the optical unit which said groove optic positioning section has said guide section and body section in claims 9 or 10, and is characterized by making the height dimension of said guide section into the range of  $1/2 - 3/4$  of height dimension of said body section.

claim 12] The positioning section which positions other side faces of a plate-like optic among said groove optic positioning sections in claim 8 is an optical unit characterized by having the three - point supporting structure of the upper part supported across the flat surface which is alternately arranged in the vertical direction in the lower receptacle portion and the two upper parts which are supported across the lower part and both the flat surfaces of the optic concerned, and counters by each.

claim 13] It is the optical unit characterized by making the draft of other two side faces other than this datum clamp face into 1 degree - 2 degrees while the draft of the datum clamp face which positions said optic is made into 0 degree - 18 degrees in claim 9 thru/or either of 12.

claim 14] claim 13 -- setting -- said -- others -- the optical unit characterized by arranging the buffer member which presses said optic against said datum clamp face, and prevents shakiness of the optic concerned in the clearance between 2nd page and the edge of said optic.

claim 15] The projection mold display characterized by having the sheathing case which contains the optical unit specified to claim 1 thru/or either of 7, the power supply unit for driving said light source section etc., and this power supply unit and said optical unit.

claim 16] The optical unit specified to claim 1 thru/or either of 4, and the power supply unit for driving said light source section etc., Have the sheathing case which contains this power supply unit and said optical unit, and it is constituted. It is the projection mold display characterized by forming this sheathing case and said head section using mold goods which consist of the same Magnesium alloy as said optical unit, and forming these sheathing cases, the head section, and an optical unit in one.

claim 17] It is the projection mold display which it has the sheathing case which contains the optical unit specified to claim 1 thru/or either of 4, the power supply unit for driving said light source section etc., and this power supply unit and said optical unit, and is constituted, and this sheathing case and said head section are formed using the mold goods which consist of the same Magnesium alloy as said optical unit, and is characterized by to form these sheathing cases and optical units in another object.

claim 18] It is the projection mold display characterized by setting said light guide and a sheathing case as ground potential in claim 15 thru/or either of 17, and being used as shielding material.

claim 19] It is the projection mold display characterized by the height dimension of a bottom light guide being  $1/2$  - of the sum total height dimension of both light guides among the light guides of the upper and lower sides which constitute said optical unit in claim 8 thru/or either of 18.

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## AILED DESCRIPTION

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### ailed Description of the Invention]

1]  
d of the Invention] This invention decomposes the flux of light from the light source into 3 colored light bundles,  
of these colored light bundles are made equivalent to image information through the light valve which consists of  
d crystal panels, and modulates them, re-compounds the modulation flux of light of each color after becoming  
ular, and relates to the projection mold display which carries out expansion projection on a screen etc. through  
ction optical system, and the optical unit used for it. It is related with the mounting structure of the optic used for  
an optical unit in more detail.

2]  
cription of the Prior Art] The projection mold display consists of each following part fundamentally. That is, they  
he projection lens unit which projects on a screen a light source lamp unit (light source section), the optical system  
ally processed so that the color picture corresponding to the image information from TV, a personal computer, etc.  
he white light bundle by which outgoing radiation was carried out from here can be compounded, and the flux of  
compounded here, a power supply unit, and the circuit board group in which the control circuit etc. was carried.  
pt for a projection lens unit, each of these parts are arranged in an equipment sheathing case, and, generally the  
ection lens unit is attached in the condition of having projected from the front face of equipment.

3] Here, optical system is color composition optical system which compounds the modulation flux of light of each  
r modulated through the liquid crystal light valve of three sheets and this liquid crystal light valve which modulate  
color separation optical system which separates into each colored light bundle in three primary colors the white light  
ble by which outgoing radiation was carried out from a light source lamp unit, and the flux of light of each separated  
r based on image information. These light source lamp units, color separation optical system, a liquid crystal light  
e, etc. are conventionally arranged with a predetermined layout in the light guide made of resin. On the other hand,  
r composition optical system and a projection lens unit are carried in the metal head object of another object with a  
t guide, and this head object is carried in a light guide. Thus, various optics will be supported by the light guide and  
ill be arranged in an equipment sheathing case with a power supply unit and a circuit board group as an optical unit.  
4] Moreover, since various kinds of optics are carried in an optical unit as aforementioned and it is necessary to  
ist those opticals axis, various optical-axis adjustment devices are constituted. And since there is remarkable  
eration of heat in a projection mold display from a light source lamp unit, color composition optical system, and a  
er supply unit, various cooler styles are also incorporated. Generally, the open air is introduced by the inhalation-of-  
an from the bleeder of a sheathing case, and it is exhausting, after passing the open air via the part of the internal  
ce of generation of heat.

5]  
blem(s) to be Solved by the Invention] This kind of projection mold displays [ many of ] are carried into a  
ference room if needed, and it is used for the purpose of projecting records etc. on a screen rather than it calls it a  
deferment type. For this reason, a projection mold display is expected a lightweight thing about [ which can be  
ied ].

6] However, in the conventional projection mold display, since the light guide made of resin is fabricated thickly  
the reinforcement is raised so that a gap may not arise in the optical axis of various optics even if there is  
arkable generation of heat from the light source section, color composition optical system, and a power supply unit,  
e is a trouble that miniaturization of a projection mold display and lightweight-ization cannot be attained. Moreover,  
wn heat dissipation nature of resin makes a light guide thick in a low top, since the heat dissipation nature from the  
and an optical unit will become low, an optic becomes an elevated temperature, and if an optic is not used with a

safety factor, there is also a trouble of causing the fall of dependability.

7] Moreover, since the light source lamp which generates a powerful noise coexists with the circuits which process the video signal at high speed, there is also a trouble that the cure against EMI is difficult.

8] Then, the technical problem of this invention is to offer the optical unit which can attain high-reliability-ization, a projection mold display while being able to aim at improvement in lightweight-izing and the heat dissipation performance by improving the quality of the material of a use member paying attention to such a point.

9] Furthermore, other technical problems of this invention are to offer the optical unit which can also take the measures against EMI easily, and a projection mold display.

10]

Means for Solving the Problem] In order to solve the above-mentioned technical problem, in this invention, process the flux of light by which outgoing radiation was carried out from the light source section, and the optical system corresponding to image information is formed. The color separation optical system which is an optical unit for projection mold displays for carrying out expansion projection of it on a projection side through projection optical system, and separates into the flux of light of two or more colors the flux of light by which outgoing radiation was carried out from said light source section, Two or more light valves which modulate the flux of light of each separated color based on image information, The color composition optical system which compounds the modulation flux of light of each color modulated through this light valve, It has the projection optical system which turns to a projection side the modulation flux of light compounded by this color composition optical system, and carries out expansion projection. In the light source section, said color separation optical system, said light valve, said color composition optical system, said projection optical system are characterized by being supported by the light guide using the mold goods which consist of a Magnesium alloy.

11] The mold goods which consist of a Magnesium alloy in this invention are the semantics also containing the mold goods which consist of a Magnesium alloy, without being limited to what consists of a magnesium independent material.

12] In this invention, as compared with the mold goods which consist of resin, the mold goods which consist of a magnesium alloy used for the light guide of an optical unit have small specific gravity, and heat dissipation nature and thermal conductivity are high. Moreover, as compared with the mold goods which consist of resin, closing in also has reinforcement. Moreover, even if it compares with the mold goods which consist of an aluminium alloy, or the mold goods which consist of a zinc alloy so that it may be shown as compared with Table 1, heat dissipation nature and thermal conductivity are comparatively [ with the large specific heat / with small and specific gravity ] high. For example, the specific gravity of the mold goods which consist of a Magnesium alloy to the specific gravity of the mold goods which consist of resin being equivalent to the mold goods which consist of about 2.7 and an aluminium alloy is about 1.8. For this reason, an optical unit can be lightweight-ized.

13]

Table 1]

特 性	マグネシウム合金		アルミニウム合金	亜鉛合金
	MD1D (AZ91D)	MD2B (AM60B)	ADC12 (A380)	ZDC2 (ZAMAK3)
重 量	1.81	1.78	2.70	6.68
引 力 (N/mm <sup>2</sup> )	240	225	310	280
引 力 (N/mm <sup>2</sup> )	160	140	165	—
伸び (%)	3	9	2	10
硬 さ (HRB)	65	60	80	82
熱伝導率 (W/mm <sup>2</sup> )	44800	44800	71000	—
熱膨張率	0.37	0.37	0.37	—
熱膨張率 (N/mm <sup>2</sup> )	100	60	140	48

14] Moreover, since it has sufficient reinforcement even if it constitutes a light guide from closing in, further light guide-ization of a part to have made it closing in and an optical unit can be attained. Furthermore, if a light guide is made closing in, since a spatial leeway will be given in a projection mold display in addition to the part and heat dissipation nature increasing, cooling effectiveness can be raised also from a structure side before and after the introduction-of-air fan stationed to the bleeder of a sheathing case -- a sufficient room can be secured and introduction of

air for cooling can be made smooth. So, since an internal temperature rise can be suppressed and the margin in the -resistant field of an optical element called a polarization sensing element etc. can be secured greatly substantially, endability improves. Moreover, the mold goods which consist of a Magnesium alloy can maintain the precision utilized since shock resistance and vibratility-proof were high as compared with the mold goods which consist of resin, and failure cannot break out easily. And since the mold goods which consist of a Magnesium alloy do not almost degradation of the quality of the material unlike the mold goods which consist of resin, they are reliable. For example, although the mold goods which consist of resin have a possibility of some resin decomposing, and this imposed thing adhering to the light source section or an optic, and reducing the engine performance when the violet rays from the light source section are received, in the case of the mold goods which consist of a Magnesium alloy, there is such no degradation. The mold goods which consist of a Magnesium alloy further again also have the advantage of being recyclable.

[5] In addition, some examples of a Magnesium alloy are shown in Table 2.

[6]

Table 2]

金系	JIS	化 学 成 分 の 比 率 (重量%)							
		Al	Zn	Mn	Si	Cu	Ni	Fe	Mg
91系	MD1A	8.3-9.7	0.35-1.0	0.15 以下	0.50 以下	0.10 以下	0.03 以下	—	残
	MD1B	8.3-9.7	0.35-1.0	0.15 以下	0.50 以下	0.35 以下	0.03 以下	—	残
	MD1D	8.3-9.7	0.35-1.0	0.15 以下	0.10 以下	0.030 以下	0.002 以下	0.005 以下	残
60系	MD2A	5.5-6.5	0.22 以下	0.13 以下	0.50 以下	0.35 以下	0.03 以下	—	残
	MD2B	5.5-6.5	0.22 以下	0.25 以下	0.10 以下	0.010 以下	0.002 以下	0.005 以下	残
41系	MD3A	3.5-5.0	0.12 以下	0.20-0.60	0.50-1.5	0.06 以下	0.03 以下	—	残

[7] In this invention, while being formed with the mold goods with which the head section and the groove optic positioning section consist of a Magnesium alloy, uniting with a light guide is desirable.

[8] If it does in this way, in carrying color composition optical system and projection optical system to a light guide using the head object of another object with it. Since there is no dispersion in the aforementioned combination backlash tolerance when the head section is constituted in a light guide at one to dispersion in the combination backlash between a light guide and a head object or tolerance not being avoided. Color composition optical system and projection optical system can be \*\*\*\*ed to a light guide, and it can carry with a sufficient precision in it by easy approaches, such as stop. So, since optical-axis adjustment becomes unnecessary, reduction of a production cost can be aimed at. Moreover, it is necessary to prepare neither a complicated positioning device nor an adjustment device in a light guide.

[9] In this invention, it is desirable that the optic installation section which equips said head section with the level reference for carrying out positioning immobilization of the prism which constitutes said color composition optical system is constituted.

[20] In this invention, it is desirable that the optic positioning section for carrying out positioning immobilization of optic which constitutes said color separation optical system, or said light valve at said light guide is constituted.

[21] Thus, since what is necessary is just to fix with adhesives etc. after inserting it in groove optic positioning circles cut an optic if constituted, many springs for giving lateral pressure to an optic and performing the positioning etc. are necessary. Therefore, since reduction of components mark can be aimed at, reduction of components cost and formation of an assembly can be realized collectively.

[22] Such the optic positioning section may constitute from the resin part united with the mold goods which consist of a Magnesium alloy.

[23] In this case, as for the resin part which constitutes said optic positioning section, it is desirable to form with one pinching with the mold goods which consist of said Magnesium alloy. That is, the structure which cannot be formed with casting shaping of magnesium, or the part which needs to constitute the positioning part of a high precision responds with resin shaping.

[24] Thus, the inside of the mold goods which consist of said Magnesium alloy in constituting, The resin through hole formed in the part in which said optic positioning section is formed. By solidifying, after resin flows said resin through hole to a background at the time of one shaping with the mold goods which consist of said optic positioning section and said Magnesium alloy. As for the resin part which constitutes said optic positioning section, it is desirable to use the mold goods which consist of this Magnesium alloy as sandwich the mold goods which consist of said Magnesium alloy fix.

[25] Thus, even when are constituted and a resin part is prepared in the mold goods which consist of a Magnesium

- only at a part, it does not drop out of the mold goods with which a resin part consists of a Magnesium alloy.
- [6] In this invention, while being formed with the mold goods with which the head section and the groove optic positioning section consist of a Magnesium alloy, uniting with a light guide is desirable.
- [7] If it does in this way, since there will be no resin part, \*\*\*\*\* or \*\*\*\*\* can do the features of the mold goods which consist of a Magnesium alloy having small specific gravity as compared with the mold goods which consist of a resin part, and excelling in the field of heat dissipation nature, and the strong field. Moreover, since the exposure product of the resin part without a resin part and the mold goods which consist of a high Magnesium alloy of heat dissipation nature is desirable, it is advantageous in respect of heat dissipation nature also from this point. Since there is furthermore no resin part in the resin part and fabricating, such as cutting of dimension \*\*\*\*\* after resin shaping, can be excluded completely, it is advantageous to low-cost-izing.
- [8] In this invention, the positioning section which positions a non-plate-like optic among the groove optic positioning sections has the guide section which guides the side edge side of the optic concerned, and it is [ the height dimension of this guide section ] more desirable than the dimension of a non-plate-like optic that it is low.
- [9] Here, the height dimension of the guide section just guides and supports more than one half of the dimension of a non-plate-like optic.
- [10] If it does in this way, since the height dimension of the guide section is low, magnesium shaping becomes easy and weight is also mitigated.
- [11] In this invention, the positioning section which positions one side face of a plate-like optic among the groove optic positioning sections has the guide section which guides the side edge side of the optic concerned, and it is [ the height dimension of this guide section ] more desirable than the dimension of a plate-like optic that it is low.
- [12] Here, the height dimension of the guide section just guides and supports more than one half of the dimension of a plate-like optic.
- [13] If it does in this way, since the height dimension of the guide section is low, magnesium shaping becomes easy and weight is also mitigated.
- [14] In this invention, the groove optic positioning section has the guide section and the body section, and, as for the height dimension of the guide section, it is desirable to consider as the range of  $1/2 - 3/4$  of the height dimension of the body section.
- [15] If it does in this way, it will have the height which can guide an optic, and magnesium shaping will become easy, and weight will also be mitigated.
- [16] As for the positioning section which positions other side faces of a plate-like optic among the groove optic positioning sections, in this invention, it is desirable to have the three-point supporting structure of the up supporter supported across the flat surface which is alternately arranged in the vertical direction in the lower receptacle section and the two upper parts which are supported across the lower part and both the flat surfaces of the optic concerned, and enters by each.
- [17] If it does in this way, since what is necessary is just to form a lower supporter and an up supporter and it is not necessary to use them as a continuous slot, while weight is mitigated, the part space which does not have a slot on the top surface is more nearly securable.
- [18] In this invention, while the draft of the datum clamp face which positions an optic is made into 0 degree - 0.008 degrees, as for the draft of other two side faces other than this datum clamp face, it is desirable to consider as 1 degree - 2 degrees.
- [19] Since what is necessary is to push an optic against datum level and just to attach it, if it does in this way, it can attach in an exact location easily and a normal image can be acquired.
- [20] In this invention, it is desirable that the buffer member which pushes an optic against the datum clamp face and prevents shakiness of the optic concerned in the clearance between other 2nd page other than datum level and the edge of the optic is arranged.
- [21] Here, elastic members, such as sponge, a tape, and resin, are mentioned as a buffer member.
- [22] Since a buffer member will be stuffed into the opposite side side of datum level after pushing an optic against datum level if it does in this way, shakiness of an optic etc. is lost and an optic can be held certainly.
- [23] Thus, the constituted optical unit is used for it being contained by the sheathing case and constituting a projection mold display etc. with the power supply unit for driving said light source section etc.
- [24] If it does in this way, since the light guide is formed with the mold goods which consist of a Magnesium alloy, it is sufficient reinforcement, even if it constitutes a light guide from closing in, and further light weight-ization of a part have made it closing in and a light guide can be attained. Furthermore, if a light guide is made closing in, since a lateral leeway will be given in a projection mold display in addition to the part and heat dissipation nature increasing,

ing effectiveness can be raised also from a structure side before and after the inhalation-of-air fan stationed to the der of a sheathing case -- a sufficient room can be secured and introduction of the air for cooling can be made oth. So, since an internal temperature rise can be suppressed and the margin in the heat-resistant field of an optical nent called a polarization sensing element etc. can be secured greatly substantially, dependability improves.

Moreover, the mold goods which consist of a Magnesium alloy can maintain the precision stabilized since shock stance and vibratility-proof were high as compared with the mold goods which consist of resin, and failure cannot k out easily. And since the mold goods which consist of a Magnesium alloy do not almost have degradation of the lity of the material unlike the mold goods which consist of resin, they are reliable. For example, although the mold ds which consist of resin have a possibility of some resin decomposing, and this decomposed thing adhering to the t source section or an optic, and reducing the engine performance when the ultraviolet rays from the light source ion are received, in the case of the mold goods which consist of a Magnesium alloy, there is such no degradation.

mold goods which consist of a Magnesium alloy further again also have the advantage of being recyclable.  
45] The projection mold display of this invention is equipped with the sheathing case which contains an optical unit rding to claim 1 to 4, the power supply unit for driving the light source section etc., and this power supply unit and ptical unit, and is constituted, and this sheathing case and the head section are formed using the mold goods which sist of the same Magnesium alloy as an optical unit, and, as for these sheathing cases, the head section, and an cal unit, being formed in one is desirable.

46] If it does in this way, since it is formed with the mold goods with which even a sheathing case consists of a gnesium alloy, the further lightweight-izing of a projection mold display besides the operation effectiveness of claim und a miniaturization can be attained, and it also becomes easy to hang and use it for head lining.

47] The projection mold display of this invention is equipped with the sheathing case which contains a power supply , and this power supply unit and optical unit for driving the light source section etc., and is constituted, this atthing case and the head section are formed using the mold goods which consist of the same Magnesium alloy as an cal unit, and, as for these sheathing cases and optical units, being formed in another object is desirable.

48] If it does in this way, the risk aversion of a cost rise (repair for the quality of mold goods and appearance quality) sheathing case can become possible, and the heat dissipation engine performance of a sheathing case can be raised. thermore, since a sheathing case and an optical unit can be sold separately, sale becomes easy.

49] Thus, as for said light guide and a sheathing case, in the constituted projection mold display, it is desirable to set ; ground potential and to use as shielding material.

50] If it does in this way, in order to carry out arc discharge to inter-electrode [ of a lamp ], in a lamp luminescence dition, a powerful noise will be emitted to the exterior. This noise is further concentrated and emitted by the ector. Since this can be completely covered in the bottom light guide of - after being set as ground potential, and a atthing case, the bad influence to the circuit which processes a feeble and high-speed signal can be prevented. reby, while being able to raise the margin of EMI, the correspondence to high-speed-signal-izing accompanying ily-minute-izing is attained more. In addition, a light guide and a sheathing case can serve as the positive ground bus of the circuit board close to it. Furthermore, it can also serve also as shielding of power-source Rhine of the team, or lamp drive Rhine.

51] As for the height dimension of a bottom light guide, it is desirable that it is  $1/2 - 2/3$  of the sum total height ension of both light guides among the light guides of the upper and lower sides from which the projection mold lay of this invention constitutes an optical unit.

52] Various components can be stabilized and attached in a bottom light guide if it does in this way.

53] [Embodiment of the Invention] Below, with reference to a drawing, the projection mold display which is the gestalt of ration of this invention is explained.

54] 1. Gestalt (whole configuration) drawing 1 (A) of the 1st operation and (B) are the front view of the projection ld display of this gestalt, and rear view, respectively. Drawing 2 (A) and (B) are the top view of the projection mold lay of this gestalt, and a bottom view, respectively. Drawing 3 (A) and (B) are the right side view of the projection ld display of this gestalt, and a left side view, respectively.

55] In these drawings, the projection mold display 1 concerning this gestalt has the sheathing case 2 made of resin ch carried out the rectangular parallelepiped configuration. Fundamentally, the sheathing case 2 consists of rear es 5 where the equipment rear face is specified as the upper case 3 and the lower case 4. From the center of the front e of equipment, the part by the side of the tip of the projection lens unit 6 has projected.

56] The AC inlet 36 and various kinds of input/output terminal groups 50 for external electric power supplies are nged at 5d of posterior walls of stomach of the rear case 5 so that drawing 1 (B) may show. Therefore, since a signal



e etc. is not put on the equipment lateral portion in which a user is usually located, it is user-friendly.

57] (Structure of a sheathing case) The upper case 3 is formed from the side attachment walls 3b and 3c and 3d of front walls on either side caudad prolonged almost perpendicularly from rectangular upper wall 3a and the side in Mikata except an after that side. Similarly, the lower case 4 is formed from the side attachment walls 4b and 4c and 4d of front walls of the right and left which have stood up almost perpendicularly from rectangular bottom wall 4a and the side in Mikata except an after that side. The rear case 5 is based on the structure of showing the inlaw parts of an upper case 3 and the lower case 4, and holding them from an outside, in the lower case 4, is fixed with screws from the inside (not shown) and is held [ upper case / 3 ] in the condition of stopping with a hook part (not shown).

58] The central part was curving to convex voice ahead slightly, the circular opening 52 by which the annular rim 51 is formed in the perimeter was formed in this part, the upper case 3 and the lower case 4 passed along this opening 52, the part by the side of the front end of the projection lens unit 6 is prolonged in the equipment front side. The guard section 53 for attaching a hand to the inferior-surface-of-tongue side for the point of the projection lens unit 6 which projects from the sheathing case 2, when raising an equipment front end side is constituted, and this guard section 53 is a rim of wrap thickness about a part for the point of the projection lens unit 6 at the shape of a hood.

59] In the edge of right and left by the side of the front of upper wall 3a of an upper case 3, many free passage holes 25L are formed in the location corresponding to a built-in loudspeaker (not shown). Moreover, the actuation switch 26 is attached in the central part by the side of the front of upper wall 3a.

50] Wrap remote control light-receiving filter 351a is arranged in the light-receiving aperture in the left-hand side of 3d of front walls which have specified the front face of equipment in an upper case 3. Moreover, remote control light-receiving filter 351b is arranged also at 5d of posterior walls of stomach of the rear case 5.

51] Feet 31R and 31L are arranged at the angle of right and left of the back end of bottom wall 4a of the lower case 4. Among those foot 31R can mainly perform horizontal adjustment of a projection screen by turning it. Foot 31C for height adjustment can be constituted by the location of the front approach of a lower case 4, and, also single hand, the direction (the projection direction from the projection lens unit 6) of the vertical direction of the body of equipment can be adjusted now by pushing the foot carbon button 310 arranged at the upper limit part which is 3d of front walls of an upper case 3.

52] The air filter covering 23 is attached in the location by the side of the front of the center at bottom wall 4a of the lower case 4. Many air holes 28 are formed in this air filter covering 23, and air is inhaled inside the sheathing case 2 through these air holes 28.

53] Moreover, the lamp replacement lid 27 is attached in the location corresponding to the light source lamp unit 8 (pre-mentioned) built in the sheathing case 2 at bottom wall 4a of the lower case 4. The stop of this exchange lid 27 is fixed and carried out to low wall 4a, and if \*\*\*\* is loosened and the lamp replacement lid 27 is demounted, the light source lamp unit 8 is exchangeable. Here, many small inhalation-of-air holes 271 are vacated for the lamp replacement lid 27, and air is inhaled also from these inhalation-of-air holes 271.

54] (Installation structure of a handle) The portable handle 38 is attached in the side face on the right-hand side of equipment so that drawing 3 (A) may show. Two end face parts 38a and 38b of this handle 38 are attached in the part of mating face of the side attachment walls 3b and 4b of an upper case 3 and the lower case 4 pivotable. Crevice 3e for handle receipt is formed in side-attachment-wall 4b of the lower case 4, and a handle 38 can be contained now here.

65] the light guide 100 contained in the sheathing case 2 as shown in drawing 4 -- any for a part for the articulated section of the right lateral and front end side, and the articulated section of a right lateral and a back end side -- although it is constituted so that it may become the oblique side sections 101 and 102 as a whole. Therefore, the clearance between these oblique side sections 101 and 102 and sheathing cases 2 is large. Then, in this example, as shown in drawing 3 (A), in case a handle 38 is attached in the lateral portion of the sheathing case 2, it is set as the part which is equivalent to the large clearance formed of the oblique side sections 101 and 102 in the installation part of the end face parts 38a and 38b.

66] Thus, if constituted, since it is not necessary to expand the width-of-face dimension of equipment in constituting installation part of the end face parts 38a and 38b, the projection mold display 1 can be miniaturized.

67] in addition, the sake when making that caudad the side attachment walls 3c and 4c of the upper case 3 and the lower case 4 where the side face of the opposite side of equipment is specified, in the condition of passing into these sides, and placing on a desk so that drawing 3 (B) may show -- pad lower -- 381 and the BADD0 upper 382 are engaged.

68] (Structure inside a sheathing case) Arrangement of each component in the interior of the sheathing case 2 of the projection mold display 1 is shown in drawing 4. As shown in this drawing, in the interior of the sheathing case 2, the power supply unit 7 is arranged toward that equipment front at the right end side. The optical unit 10 which carried the

source lamp unit 8 and the projection lens unit 6 in the location which adjoined equipment right-hand side rather this is arranged.

9] Drawing 5 is the perspective view showing the appearance of the optical unit 10 of this gestalt.

0] As shown in drawing 5, optical elements other than projection lens unit 6 are contained, and the profile configuration of the optical unit 10 of this gestalt is carried out from the light guide 100 which consists of up-and-down guides 901 and 902, and the projection lens unit 6. It unites with the projection lens unit 6, and a light guide 100 is l to the lower case 4 by the lock screw.

1] In the optical unit 10, the optical path which results in the projection lens unit 6 is an abbreviation L typeface the light source lamp unit 8 as a whole, and the flat-surface configuration of the optical unit 10 also has the deviation L typeface corresponding to the optical path of this configuration.

2] On the other hand, a power supply unit 7 is equipped with the body part 71 arranged towards the equipment front equipment back, and the installation part 72 crooked at the front edge of the body part 71 so that flat-surface the configurations of L characters of the optical unit 10 and the reverse sense may be constituted, and this installation part located in the side of the projection lens unit 6. The auxiliary cooling fan 17 is built in the edge of the installation 72 of a power supply unit 7.

3] In addition, although illustration is omitted, each configuration component is built in the interior of a metal casing, and the power supply unit 7 has prevented that the electric and magnetic noise generated in this part outside. The shielding case used for this constitutes the path of the air for cooling which flows to the light source unit 8 from a power supply unit 7 while constituting the path at the time of the air for cooling flowing the power supply unit 7 interior. Furthermore, the shielding case is intercepting the noise which is interlocked with AC input line about by this power supply unit 7 and the actuation which opens the lamp replacement lid 27, and carries Safety ch, such as an interlock switch which is interlocked with closing motion of the lamp lid 27, and intercepts automatically the electric power supply to the light source lamp unit 8, covers the output line to the light source lamp 8 etc., and is generated.

4] Thus, if a power supply unit 7 is also made into flat-surface the configuration of L characters and combines it, using conversely that the optical unit 10 is flat-surface the configuration of L characters, the inside of the field led in the optical unit 10 and the sheathing case 2 will not become useless. So, since the optical unit 10 and a power supply unit 7 can be arranged in a narrow field, the miniaturization of the projection mold display 1 can be attained.

5] As shown in drawing 6 (A), the cooling air intake 150 possessing the inhalation-of-air fan 15 for cooling is placed at the part located under the prism unit 910 which constitutes a color composition means to mention later using the bottom surface parts of the sheathing case 2.

6] On the other hand, the exhaust port 160 equipped with a ventilating fan 16 to the rear case 5 is constituted, and exhaust port 160 is constituted from an equipment back end side by the overhang part 501 partially jutted out of the case 5. Thus, a scratch sound can be prevented by having kept away the exhaust port 160 from the ventilating fan

7] (Arrangement structure of a substrate) As shown in drawing 5 and drawing 6 (A), and (B), the driver substrate 13 (strate for drive circuits) for liquid crystal drive control \*\*\*\*s, stop immobilization is carried out at the top-face side light guide 100 where some optics which constitute the optical unit 10 were contained, and the video substrate 11 which the video signal processing circuit was carried in the top-face side in parallel with this is arranged. The driver substrate 13 and the video substrate 11 are arranged by each so that the substrate back end section may arrive near equipment back end side, the input/output terminals of a D-sub connector are attached to the back end of the video substrate 11 direct picking, and they constitute a part of input/output terminal group 50 of the rear case 5. Therefore, the wiring distance between the input/output terminal 50 constituted by the equipment back end side, and the driver substrate 13 and the video substrate 11 can be shortened, the circuit system which processes a high speed and a feeble signal cannot be easily influenced of a noise etc.

8] The audio substrate 180 which performs the interface of a television picture or a sound signal between the back side of a light guide 100 and the rear case 5 is arranged perpendicularly, and wiring connection of this audio substrate 180 is made to the back end section of the video substrate 11. The metal chassis 181 is arranged between the audio substrate 180 and the rear case 5. The chassis 181 is connected conductively to the light guide 100 which is a metal case. Thus, by carrying out contiguity arrangement of between each substrate, a mutual wiring distance is shortened, and it constitutes so that it may be hard to be influenced of a noise. Moreover, it can be fixed to the rear case through a chassis 181, and the audio substrate 180 can bear now the insert-and-remove force of joining the interface signal mounted in the audio substrate 180.

9] The electrical installation between each substrate 11 and 13 is as follows. First, a connector 114 is arranged on

inferior surface of tongue of the video substrate 11, it inserts in a connector 114 and the connector 116 which can be connected is arranged on the top face of the driver substrate 13. Therefore, will be connected by the connector comrade in condition of having arranged each substrates 11 and 13. Thus, in this example, since it is formed without connection between each substrate taking about lead wire etc., there are few noise generation sources and they can control generating of a noise. Moreover, since it is formed on the top face of a light guide 100 and stop immobilization is carried about the driver substrate 13, where the driver substrate 13 is fixed to the optical unit 10, OEM etc. can be formed, and it is convenient.

30] That is, since a property is delicately different respectively, after assembling the optical unit 10, the light valve (mentioned) contained in the light guide 100 needs to perform electric adjustment, in order to acquire desired image quality.

31] If the configuration which the driver substrate 13 is formed on the top face of a light guide 100, and carries out stop immobilization is adopted like this example, after the driver substrate 13 performs electric adjustment, it is not necessary to make a set the driver substrate 13 and the optical unit 10, to deliver a user, and to perform electric adjustment at all at a user here.

32] The remote substrate 140 in which the remote digital disposal circuit for performing signal processing inputted from a mouse etc. to the inferior-surface-of-tongue side of a light guide 100 was carried is arranged. Here, the remote substrate 140 is arranged possible [ insert and remove ] from the equipment back end side. for this reason, remote one to mouse etc. -- business -- even if it is necessary to use the circuit board of the circuitry which changes with models at a circuit, it can respond easily by replacing the remote substrate 140 from an equipment back end side.

33] (Optical unit) With reference to drawing 7 -11, the optical system included in the optical unit 10 is explained. In addition, drawing 8 -11 are a sectional view in the A-A line of drawing 7, a B-B line, a C-C line, and D-D line, respectively. The color separation optical system 924 by which the optical system of this example separates into red, green, and each blue colored light bundles R, G, and B the flux of light by which outgoing radiation is carried out from illumination-light study system 923 and this illumination-light study system 923, The liquid crystal light valves 925R, 925G, and 925B of three sheets as a light valve which modulates each colored light bundle, It consists of a prism unit 910 as color composition optical system which re-compounds the modulated colored light bundle, and a projection unit 6 which carries out expansion projection of the compounded flux of light on a screen.

34] The illumination-light study system 923 is equipped with the light source lamp unit 8 (light source section), the integrator lenses 921 and 922, the polarization sensing element 920, the condenser lens 930, and the reflective mirror

35] The light source lamp unit 8 consists of a light source lamp 801 and a lamp housing 802 which builds this in, as shown in drawing 12. The light source lamp 801 consists of reflectors 806, and carries out outgoing radiation of the light from the body 805 of a lamp to the bodies 805 of a lamp, such as a metal halide lamp, towards the integrator lens side in accordance with an optical axis. As a body 805 of a lamp, a halogen lamp, a metal halide lamp, a xenon lamp, etc. can be used.

36] As for the lamp housing 802, the front face of the direction of an optical axis serves as opening. The passage holes 808 and 809 of the air for cooling and the passage hole (not shown) formed in the tooth-back side of a reflector are formed in the side-face part of a lamp housing 802. In this example, this lamp housing 802 and the light source lamp 801 are formed in one, and these are detached at the time of lamp replacement and attached with one.

37] The integrator lenses 921 and 922 consist of the aggregate of two or more rectangle lenses arranged in the shape of a matrix, and the flux of light by which outgoing radiation was carried out from the light source lamp 801 is divided into two or more partial flux of lights. The polarization sensing element 920 is an optical element which changes into light of one kind of polarization component each of the partial flux of light divided with the integrator lenses 921 and 922. It is divided by the integrator lenses 921 and 922 and the field of light valves 925R, 925G, and 925B is applied on each of the partial flux of light changed into the light of one kind of polarization component by the polarization sensing element 920 with a condenser lens 930. The reflective mirror 931 is for turning the main optical axis of the outgoing radiation light from an illumination-light study system to equipment front, and bending at a right angle.

38] The color separation optical system 924 consists of a red-green reflective dichroic mirror 941, a green reflective dichroic mirror 942, and a reflective mirror 943. First, in the red-green reflective dichroic mirror 941, the red flux of light R included in the flux of light by which outgoing radiation was carried out from the illumination-light study system 923, and the green light bundle G are reflected by the right angle, and it goes to the green reflective dichroic mirror 942 side. This mirror 941 is passed, it is reflected by the right angle by the back reflective mirror 943, and outgoing radiation of the blue glow bundle B is carried out to the prism unit 910 side from the outgoing radiation

ion of a blue glow bundle. Among the red and the green flux of lights R and G which were reflected in the mirror in the green reflective dichroic mirror 942, the green light bundle G is reflected by the right angle, and outgoing radiation is carried out to a color composition optical-system side from the outgoing radiation section of a green light bundle. Outgoing radiation of the red flux of light R which passed this mirror 942 is carried out to the light guide system side from the outgoing radiation section of the red flux of light. The light guide system 927 consists of the incidence lens 974, the incidence side reflective mirror 971, an outgoing radiation side reflective mirror 972, a middle lens arranged among these, and a condenser lens 953 arranged to the near side of liquid crystal panel 925B.

99] Condenser lenses 951 and 952 are arranged at the outgoing radiation side of the outgoing radiation section of the blue glow bundle B of the color separation optical system 924, and the green light bundle G, respectively. Incidence of a colored light bundle which carried out outgoing radiation from each outgoing radiation section is carried out to the condenser lenses 951 and 952, and it is made parallel.

100] Thus, incidence of the blue and green flux of lights B and G made parallel is carried out to the liquid crystal light valves 925B and 925G, they are modulated, and the image information (image information) corresponding to each colored light is added. That is, according to image information, switching control of these light valves is carried out by non-illustrated driving means, and, thereby, the modulation of each colored light which passes through this is formed. Such a driving means can use a well-known means as it is. On the other hand, the red flux of light R is led to the liquid crystal light valve 925R which corresponds through the light guide system 927, and a modulation is similarly formed in here according to image information. What used poly-Si TFT as a switching element can be used for the liquid crystal light valve of this example. In addition, 9251 are a flexible printed circuit board for supplying a signal to liquid crystal light valves 925R, 925G, and 925B among drawing 8 and drawing 10.

101] Moreover, the liquid crystal light valves 925R, 925G, and 925B are arranged so that it may counter to each end of the prism unit 910, and before and behind that, the polarizing plate made of synthetic resin (not shown) stuck on glass plate is arranged.

102] Next, incidence of each colored light bundle modulated through each liquid crystal light valve 925R, and G and carried out to color composition optical system, and it is compounded here. Color composition optical system consists of these examples using the prism unit 910 which consists of a dichroic prism as mentioned above. Expansion section of the flux of light compounded here is carried out on the screen in a position through the projection lens unit

103] Thus, with this gestalt, it is reflected by the reflective mirror 931 within a light guide 100, and the flux of light by each outgoing radiation was carried out from the light source lamp 805 advances the optical path of L typeface of the light guide way around in alignment with the flat-surface configuration of L typeface of a light guide 100, and reaches the color separation optical system 924 and the prism unit 910. therefore -- while each optic is arranged in a narrow field -- optical path -- the maximum -- it has set up for a long time. So, the liquid crystal light valves 925R, 925G, and 925B can be made [ while using a lens with a small F value and ] to reach by making into the parallel flux of light the flux of light by which outgoing radiation was carried out from the light source lamp unit 8, fully securing the arrangement of the integrator lenses 921 and 922 or the polarization sensing element 920.

104] Drawing 13 (A) is the perspective view of the bottom light guide 901 which constitutes the optical unit of this example. Drawing 14 is the perspective view of only the part of the mold goods which consist of a Magnesium alloy used in the bottom [ this ] light guide 901, and drawing 15 is the mold goods which consist of a Magnesium alloy in the bottom [ this ] light guide 901, and the perspective view which extracted only the resin part really fabricated.

105] As shown in these drawing 13 (A), and 14 and 15, the body part of the bottom light guide 901 consists of mold goods 900 which consist of a Magnesium alloy. In the bottom [ this ] light guide 901, the light source lamp unit 8, configuration \*\*\*\*\* 923, the color separation optical system 924, the light guide system 927, the liquid crystal light valves 925R, 925G, and 925B, The space 800, 9240, and 9250 for arranging the prism unit 910 is constituted. In each case The optic positioning section 190 (in drawing 13 (A), the sign is given only to the part which carries out positioning immobilization of the polarization sensing element 920.) for positioning the various optical elements for constituting the above-mentioned optical system It is constituted. Moreover, the space 800 for arranging the light source lamp unit 8 is constituted so that the mold goods 900 which consist of a Magnesium alloy may cover the top face of the light source lamp unit 8.

106] On the other hand, since the structure which cannot be formed with dies casting shaping of magnesium, or a high precision is searched for, the optic positioning section 190 has been formed by resin. The fixed slot 198 which extends in the vertical direction is formed in the opposed faces of the resin part 199, and it is altogether fixed to the optic positioning section 190 using the fixed slot 198 of the optic positioning section 190 about the optic equipped with a plate-like optic or the plate-like flat-surface section (flange) among an illumination-light study system, color separation

cal system, a light guide system liquid crystal light valve, and the optic that constitutes color composition optical em. That is, after inserting an optic plate-like [ these ] in the fixed slot 198, it is fixed with adhesives etc. In addition, or the resin used for the resin part 199, it is desirable that coefficient of linear expansion is as near as a Magnesium y, for example, PC and PPS containing glass are used.

97] As shown in drawing 13 (B), the resin through hole 909 is formed in the part in which the optic positioning ion 190 which is the resin part 199 among the mold goods 900 which consist of a Magnesium alloy is formed (in ving 14 , the sign is given only to the part). When the resin part 199 and really fabricating the mold goods 900 which consist of a Magnesium alloy with outsert shaping, it solidifies, after making resin flow through the resin through hole to the background of the mold goods 900 which consist of a Magnesium alloy as the drawing 13 (B) Nakaya mark shows. Consequently, the resin part 199 which constitutes the optic positioning section 190 fixes to the mold goods which consist of a Magnesium alloy as sandwich the mold goods 900 which consist of a Magnesium alloy. Therefore, even when the resin part 199 is attached in some mold goods 900 which consist of a Magnesium alloy, it is not drop out of the mold goods 900 with which the resin part 199 consists of a Magnesium alloy. Of course, even if based on outsert shaping of the mold goods 900 which consist of a Magnesium alloy, the resin part 199 which consists of another components to the mold goods 900 which consist of a Magnesium alloy may be fixed by approaches, such as adhesion, but when the mold goods 900 which consist of a Magnesium alloy are manufactured with outsert shaping like this gestalt, productive efficiency is high and, moreover, there is an advantage that dimensional accuracy is high.

98] Thus, since the resin part 199 is used only for the part, though the constituted bottom light guide 901 of processes, such as trimming after shaping (cutting of dimension \*\*\*\*), is hardly unnecessary and is required, few man s are sufficient for it. So, the conversion costs which the fabricating after shaping took the whole as compared with case where it constitutes from mold goods which consist of resin are greatly reducible.

99] Furthermore, as shown in drawing 13 (A) and drawing 14 , the head section 903 for fixing synthetic optical em and projection optical system to the bottom light guide 901 is also constituted by one. The head section 903 consists of fundamentally a perpendicular wall 91 prolonged with a perpendicular posture towards the cross direction of ipment, and a bottom wall 92 horizontally prolonged from the lower limit of this perpendicular wall 91. Each piece rism from which the thin resin part 199 (refer to drawing 15 ) which equips the front face of a bottom wall 92 with difference 198A as the optic installation section of color composition optical system is constituted by a bottom l 92 and one, and constitutes the prism unit 910 on this optic installation section 190A is fixed after having been itioned by level difference 198A. In addition, this resin part 199 as well as the resin part 199 (refer to drawing 9 ) ch constitutes the optic positioning section 190 described previously is formed of the outsert format. Therefore, the n part 199 which constitutes the optic installation section 190 has fixed to the mold goods 900 which consist of a gnesium alloy as sandwich the mold goods 900 which consist of a Magnesium alloy through the resin through hole

100] Opening 91b of a rectangle for the outgoing radiation light from the prism unit 910 to pass is formed in the iral part of the perpendicular wall 91. 91d of screw-thread holes for fixing the end face side (a part for a flange) of projection lens unit 6 to this perpendicular wall 91 is formed in four places. Therefore, in the front face by the side e front face of the perpendicular wall 91, the end face side of the projection lens unit 6 can be \*\*\*\*ed, it can fix / by the stop, and the prism unit 910 can be directly fixed to the top face of a bottom wall 92 at the rear-face side.

101] Thus, since the head section 903 is really fabricated beforehand and there is no dispersion in combination klash or tolerance between a light guide 901 and the head section 91, mutual alignment can be easily performed to bottom light guide 901 only by fixing the projection lens unit 6 and the prism unit 910, as the perpendicular wall 91 iserted. So, since it is necessary to establish neither optical-axis adjustment nor a complicated positioning device nor djustment device while an assembly activity is easy, reduction of cost can be aimed at. And since it excels also in a integrity, even if impulse force etc. acts after an assembly, there is an advantage that there are very few sibilities that a mutual location gap may occur.

102] 91g of three free passage holes for circulating the air for cooling is formed in the bottom wall 92 of the head ion 903. The aforementioned inhalation-of-air fan 15 is attached in the rear face of this bottom wall 92, and the air cooling inhaled by the inhalation-of-air fan 15 flows also into the bottom wall 92 bottom through 91g of these free sage holes so that drawing 6 (A) may show.

103] As explained above, in constituting a light guide 901, with this operation gestalt, the mold goods which consist Magnesium alloy instead of the mold goods which consist of resin, or the mold goods which consist of an nium alloy are used. The mold goods which consist of this Magnesium alloy have small specific gravity as pared with the mold goods which consist of resin. For example, since the specific gravity of the mold goods which

sist of a Magnesium alloy to the specific gravity of the mold goods which consist of resin being equivalent to the d goods which consist of about 2.7 and an aluminium alloy is about 1.8, it can lightweight-ize an optical unit.

04] Moreover, even if it sets a light guide 901 to about 1.5mm at closing in, since the mold goods 900 which consist of Magnesium alloy bear generation of heat from the light source lamp 805, the prism unit 910 which constitutes color position optical system, or a power supply unit 7, and the weight of an optic, they can keep an optical axis good precision ]. So, lightweight-ization of the optical unit 10 can be attained to the part and pan as for which a light guide is made to closing in, and a cellular phone and handling become easy.

05] Furthermore, the mold goods 900 which consist of a Magnesium alloy can also raise the heat dissipation nature in the interior seen from an ingredient side also from the point that heat dissipation nature is high and is made to closing in. Therefore, an internal temperature rise can be suppressed. For example, since it is a product made of resin, if polarization sensing element weak with heat is mentioned as an example, according to the structure of this gestalt using the mold goods 900 which consist of a Magnesium alloy conventionally using the light guide made of resin as compared with structure, 10 degrees C - no less than 20 degrees C of temperature in the steady state of a polarization sensing element can be lowered. So, since the margin in the heat-resistant side of an optical element called a polarization sensing element etc. is greatly securable, dependability improves. Conversely, if an equivalent life is sufficient as long as it says, a smaller optical element can be used on the same service condition as the former, and it can lead to the display of high brightness, miniaturizing.

06] Moreover, an equivalent life is sufficient, and if the optical element of the same size is used, it can be said that improvement in the part and an illuminance can be aimed at.

07] Furthermore, the mold goods 900 which consist of a Magnesium alloy can maintain the precision stabilized since shock resistance and vibratility-proof were high as compared with the mold goods which consist of resin, and failure not break out easily. And since the mold goods 900 which consist of a Magnesium alloy do not almost have radiation of the quality of the material unlike the mold goods which consist of resin, they are reliable. For example, though the mold goods which consist of resin have a possibility of some resin decomposing, and this decomposed resin adhering to the light source section or an optic, and reducing the engine performance when the ultraviolet rays in the light source section are received, in the case of the mold goods 900 which consist of a Magnesium alloy, there is no degradation. The mold goods 900 which consist of a Magnesium alloy further again have the advantage of being recyclable.

08] Moreover, since the mold goods 900 which consist of a Magnesium alloy used for the light guide 901 have ductivity good by itself, they can fix to ground potential mold-goods 900 self (light guide 901 self) which consists of Magnesium alloy, and can use it as \*\*\*\* and a grand bus line. Therefore, if the gland from each substrate is dropped on mold-goods 900 self (light guide 901 self) which consists of a Magnesium alloy, it can shield by remaining as it is. Since the optical unit 10 occupies the large field superficially in the interior of the sheathing case 2 of the projection display 1, while itself fully achieves the function as shielding material, even if it arranges a substrate in which a substrate can be dropped to a gland from a substrate only by using a small direct or ground plate, without using a ground plate. So, that each substrate can be arranged to the upper part of the optical unit 10, a lower part, or the like etc. has a high degree of freedom about the arrangement location of each substrate.

09] Furthermore, as shown in drawing 13 (A), the light source lamp unit 8 is contained in space 800. Therefore, the face and side face of the light source lamp unit 8 have structure covered with the shielding material which consists of mold goods 900 which consist of resin which consists of a Magnesium alloy. For this reason, the noise generated at time of lighting of the body 805 of a lamp does not leak outside. Therefore, though it is easy structure in the projection mold display 1 of this true form voice, the cure against EMI is also thoroughgoing. moreover, the projection display 1 of this true form voice which carries the circuit which processes the feeble video signal accelerated more emitting -- radiation \*\*\*\* from the body 805 of a lamp -- since a powerful noise can be certainly covered by the upper light guide 902 and the bottom light guide 901, dependability can be boiled markedly and can be raised.

10] Moreover, although the prism unit 910 is arranged on a bottom wall 92 in the head section 903 of the bottom light guide 901 as shown in drawing 11, optic positioning section 190A constituted by one functions on the top face of the bottom wall 92 as a prism stationary plate. For this reason, it is not necessary to use the prism stationary plate of other object in this true form voice. And since the bottom light guide 901 consists of magnesium dies casting articles of closing in also including the head section 903, it is generous that much in tooth space. So, with this gestalt, sufficient rooms 151 and 152 are securable for the upper and lower sides of the inhalation-of-air fan 15 stationed to a order 150. So, that introduction of the air for cooling can be made smooth etc. can suppress a static pressure fall also on a structure side, and cooling effectiveness can be raised. That is, since the air for cooling which the inhalation-of-air fan 15 inhaled serves as a laminar flow and flows, the air for cooling is smoothly inhaled by a part with small fluid



stance, and the inhalation-of-air fan 15, and it is smoothly supplied towards the prism unit 910. So, cooling effectiveness is high.

1] In addition, covering (not shown) of the shape of a prism duct and a mesh for protection against dust may be engaged on the top face of the prism unit 910. Thus, invasion of the dust at the time of the inside of the passage of the flowing style serving as negative pressure, and flowing backwards at the time of the foreign matter which has fallen, or power-source OFF, is prevented.

2] Each optic positioning section 190 shown in drawing 15 other than the operation gestalt described above is usually combined in the runner section (not shown) when carrying out fabrication, positioning accuracy is taken out, the same effectiveness can be acquired, even if it applies to the mold goods 900 which consist of said Magnesium alloy using the aforementioned resin through hole 909 and fixes by the stop, caulking, etc.

3] 2. The 2nd operation gestalt of this invention is shown in the 2nd operation gestalt drawing 16, and, as for this operation gestalt, said 1st operation gestalt also constitutes the optic positioning section from mold goods which consist of Magnesium alloy with a light guide to constituting from mold goods which consist only a light guide of a Magnesium alloy.

4] In this case, the powder of magnesium may be kneaded with resin and fabrication may really be carried out also including the optic positioning section 190 by the shaping approach which a resin part is dispersed and is fabricated to a division with heat or heat, and a pressure after shaping.

5] In addition, in the 3rd operation gestalt stated to this operation gestalt and degree, while giving the same sign to same structure as said 1st operation gestalt, and a use member, that detailed explanation is omitted or simplified.

6] Recently, in the method of a magnesium fabrication method, the same fabrication as resin shaping is possible in state of solid-liquid [ adapting a thixotropy ]. And when the method of this processing method is adopted, in order the possibility of \*\* light-gage shaping and \*\* dimensional accuracy may come out, there is an advantage, like improvement in on the strength according [ machining of a dimension \*\*\*\*\* sake ] to needlessness and \*\* shaping consistency rise can be aimed at.

7] On the other hand, there are troubles, like the buffer structure where consideration of \*\* fluidity nature realizes shock resistance in case [ to the need and \*\* mold ] it eats, and it is attached, and a preventive measure direct-supports dispensable and \*\* optics and guides them by magnesium material becomes indispensable.

8] Hereafter, it explains in full detail also including such a viewpoint.

9] With the \*\*\*\*\* 2 operation gestalt, since optic positioning section 190' was also used as the mold goods which consist of a Magnesium alloy, the gestalt of positioning section 190' has been changed to the positioning section 190' of said resin.

20] Namely, as a detail is shown in drawing 16 and 17, as for part A-190' which positions first the optic 951-953 which is not plate-like, i.e., condenser lenses, and the middle lens 973, the height dimension has the receptacle section in which body section 199' of H and a height dimension support guide section 198' of h, and the lower limit section of lens 951 grade. Although this guide section 198' is formed in the groove which puts the both-sides surface part of lens 951 grade while it projects outside from body section 199', and that height dimension h is set to  $1/2 < h < 3/4$ , it is about 1/2 the height dimension H of body section 199' / two to 2/3 preferably. And the height dimension H of the body section is formed in the almost same dimension as the diameter of a lens. Moreover, it is formed so that the receptacle section may also put the both-sides surface part of lens 951 grade, and in body section 199', the rib 196 for reinforcement and a fluidity nature improvement is formed in the opposite side of guide section 198'.

21] Here, the height dimension of guide section 198' was made low because it is not necessary to necessarily make height dimension of guide section 198' the same as the diameter of lens 951 grade and since the lens 951 grade is plate-like, and it was made for fabrication to become easy that what is necessary is just to be able to guide lens 951 grade.

22] the plate-like optic 921 and 922 among optic positioning section 190', i.e., integrator lenses, the polarization sing element 920, and reflective mirror 941- 943, 971, and positioning section B-190' for 972 have three-point fixed structure, as shown in drawing 18 and 19.

23] Namely, the groove receptacle section 982 which is the bottom light guide 901 concerned and really formed in base of the bottom light guide 901, and supports the lower part of mirror 941 grade, It consists of up supporters 983 which are the bottom light guide 901 concerned and really formed in the side face of the bottom light guide 901, and support the upper part and both the flat surfaces of reflective mirror 941 grade. Besides, the section supporter 983 is held by two positioning members 983A and 983B arranged by shifting in the vertical direction. Moreover, the whole face is the datum clamp face 984 among the second page which contacts reflective mirror 941 grade in the receptacle section 982 and the up supporter 983, and the draft of this datum clamp face 984 has become 0 degree - 0.008 degrees.

Moreover, draft of the 2nd page with this another datum clamp face 984 is 1-20 degrees. thus, the mold according to the reaction after shaping by preparing inclination in the receptacle section 982 and a supporter 983 -- it can eat and can be prevented.

4] And among other 2nd page and reflective mirror 941 grades with another such receptacle section 982 and datum up face 984 which can be set up supporter 983, as shown in drawing 20 , in order to support mirror 941 grade that is nothing with backlash, the shock absorbing material 985 which becomes by elastic members, such as sponge, a and resin, is arranged.

5] Since according to such a 2nd operation gestalt the same effectiveness as said 1st operation gestalt can be fired, and also the impact which joins a mirror and lenses with shock absorbing material 985 can be buffered and is no resin part, as compared with the mold goods which consist of resin, specific gravity becomes small, and the 1 goods which consist of a Magnesium alloy are effective in the ability of \*\*\*\*\* or \*\*\*\*\* to be able to do the res of excel in the field of heat dissipation nature, and the strong field.

6] Moreover, since the exposure product of a part without a resin part and the mold goods which consist of a high magnesium alloy of heat dissipation nature is large, it is advantageous in respect of heat dissipation nature also from point. Since there is furthermore no resin shaping part, fabricating, such as trimming after resin shaping, can be added completely, and it is advantageous to low-cost-izing.

7] Furthermore, although the height dimension of guide section 198' of the positioning section of condenser lens grade is lower than the diameter of lens 951 grade, since it is formed in the dimension which can be guided There is flow of a molten bath in fabrication, end, and processing is easy. Reflective mirror 941 grade the positioning ion Since it consists of the receptacle section 982 and an up supporter 983 and shock absorbing material 985 is fed among other 2nd page and reflective mirror 941 grades with the another datum clamp face 984 of these ptacle section 982 grades, mirror 941 grade can be supported that there is nothing with backlash.

8] 3. The 3rd operation gestalt of this invention is shown in the 3rd operation gestalt drawing 21 and 22, and with operation gestalt, consider as the mold goods with which a sheathing case also consists of a Magnesium alloy des a light guide, the head section, and the optic positioning section, and unify a sheathing case and a light guide. ut the other part, it is the same as that of the operation gestalt mentioned above.

9] In projection mold display 1' of this operation gestalt, sheathing case 2' containing lower case 4' is formed with mold goods which consist of a Magnesium alloy, and since area is also large, such sheathing case 2' is formed so a molten bath (magnesium molten metal) may fully die and may cross to all the corners. That is, as shown in ving 23 , the concave configuration section 211 is formed in the opposite side of the gate 210 and one corner (the p storage near [ for example, ]) which were formed in sheathing case 2' across that corner Fig., it throws away into concave configuration section 211, and the runner 212 is formed in it. And in this concave configuration section , after removing a runner 212, crimp processing was performed and this has avoided the defect of the appearance of sheathing case 2'. Moreover, the projected rib 213 of two or more articles is formed in the opposite side of the 210 in the shape of a wave on the whole from the front face, and they are conspicuous even if a blow hole, \*\*\*\*\*, E, etc. should arise in a location distant from the gate 210. Moreover, the gate 210 is formed so that board thickness become thin, as it is made into the configuration which spreads in the direction of outside from sheathing case 2' goes in the direction of outside.

10] Moreover, although not illustrated, opening (for example, actuation switch section) of a sheathing case is built over the rib for fluidity reservation so that a molten bath may fully go to the perimeter and it may cross at the time haping.

11] In addition, two or more holes which miss grinding bubble \*\*\*\* to a mold configuration top lower case must be le in optic positioning section 190' which positions reflective mirror 941 grade.

12] By considering as the mold goods with which a sheathing case also consists of a Magnesium alloy in addition to ght guide, as shown in drawing 22 , the shielding case which constitutes a power supply unit 7 is made unnecessarily. because a light guide and a sheathing case can have a shielding function. And while forming the groove receptacle ion 73 along with the longitudinal direction of bottom light guide 4' as shown in drawing 24 in not establishing the lding case which constitutes a power supply unit 7 in this way, two or more ribs 74 which intersect perpendicularly i this groove receptacle section 73 are formed. And what is necessary is to store the edge of substrates 77 in this ptacle section 73, and just to fix on cross-section [ of L characters ]-like a bracket 75 and a screw 76. In addition, it is necessary is just to cover with a resin plate etc., when specific passage is made for the circuit block of the power ply unit 7 interior etc. and you need cooling. Therefore, fully giving EMI correspondence, small [ of a product ] and tweight-ization can be performed as it is possible.

13] The upstream filter 78 is arranged in one corner in such sheathing case 2', and the upstream active filter 79 and



rectifier circuit (diode bridge) 80 are arranged in the corner of the opposite side. Moreover, it is attached in strates 77, and a heat sink 81 is arranged and drive F ET and the diode 82 for antisuckbacks for chopper circuits are shed in this heat sink 81.

44] Here, as shown in drawing 25, when the height dimension which totaled the bottom light guide 901 and the upper light guide 902 is set to R and the height dimension of the bottom light guide 901 is set to r, the ratio of the height of the bottom light guide 901 of such a light guide and the upper light guide 902 is set to  $1/2 R < r < 3/4 R$ , and is preferably set to  $r = 2/3 R$ . Therefore, in case equipment is installed in head lining, a wall surface, etc., it is possible for it to be necessary to hold the body of equipment with a holder, and to attach and install a harness in a holder, and to attach and install a direct harness in sheathing case 2'.

45] In addition, this ratio is good as the same also with said 1st and 2 operation gestalt.

46] Thus, in order to make a short time for 25 / 1000 seconds fabricate, light-gage shaping is established by considering as the configuration which does not spoil fluidity nature, and a dimension setup. Moreover, the height of the lens section (not shown) of part A-190' which positions condenser lenses 951-953 and the middle lens 973 is also set into necessary minimum. The same is said of the guide section of positioning section B-190' for optics mirrors 943 grade plate-like. Thus, by making the height of the guide section into necessary minimum, the optic positioning section with long length breaks down from closing in by the molten bath fabricated with a high speed and high pressure, prevention is possible, and improvement in positioning accuracy can be aimed at.

47] Since sheathing case 2' is formed with the magnesium cast, although equipment is lightweight, projection mold display 1' of this operation gestalt is strong, for example, it can be used for head lining, hanging it.

48] That is, as shown in drawing 22, the tap is cut by at least two or more bosses 215 formed in the rear face of sheathing case 2', and on the other hand, the harness 216 is formed so that sheathing case 2' may be enclosed from an inside. This harness 216 starts from the rear face of sheathing case 2' along a both-sides side, and it can use now projection mold display 1' for head lining, hanging it. That is, after making a screw screw in a boss's 215 tap and attaching a harness 216 from the outside of case 2', while pressing flange 216A against head lining, it fixes with a bolt. It can be equal also to the use which hangs a body conversely by the boss whom sheathing case \*\*\*\* of magnesium material therefore twisted off and processed enough in reinforcement.

49] Since according to such a 3rd operation gestalt the effectiveness of said 1st and 2 operation gestalt and the same effectiveness can be acquired and also it has become the mold goods with which sheathing case 2' also consists of a magnesium alloy, it is effective in becoming what turned into what was excellent in lightweight-izing and heat insulation nature much more from the projection mold display of a 1st and 2 operation gestalt, and was excellent also in strong field. Moreover, since it is lightweight-ized, descendant expansion of goods, such as hanging and using it for head lining, can be extended easily.

50] (Gestalt of other operations) Using the optical unit 10 in the 1st operation gestalt, as shown in drawing 26, projection mold display 1A of a rear mold may be constituted. In this case, the light by which outgoing radiation was emitted out from the optical unit 10 is reflected by Mirrors 101A and 102A, and it projects on lenticular screen 103A (projection side).

51] Moreover, it considers as the combination of the light guide of mold goods and the sheathing case 2 made of magnesium which consist of a Magnesium alloy, and although light guide 10' and sheathing case 2' were really fabricated with mold goods which consist of a Magnesium alloy, not only this but a light guide and sheathing are formed with the mold goods which consist of a Magnesium alloy separately, and you may make it combine these in the 3rd operation gestalt with said 1st operation gestalt.

52] If it does in this way, the effectiveness of each of said operation gestalt and the same effectiveness can be acquired, and also the effectiveness that the cost rise (repair for the quality of mold goods and appearance quality) of a sheathing case can be suppressed, and the effectiveness that both can be sold separately, without being influenced by the appearance design in OEM of an optical unit can be acquired.

53] Moreover, although shock absorbing material 905 was stuffed among other 2nd page and reflective mirror 941 faces with the another datum clamp face 904 of receptacle section 902 grade and it had lost with [ of reflective mirror grade ] backlash with said 2nd operation gestalt, you may make it attach a tape or the resin material 905 in field where the datum clamp face 904 is another by adhesion or outer SATO, as shown not only in this but in drawing 27.

54] And even if such, reflective mirror 941 grade can be supported that there is nothing with backlash.

55]

[Effect of the Invention] As explained above, in the optical unit and projection mold display concerning this invention the specific gravity is small as compared with the mold goods with which this magnesium consists of resin changing quality of the material of a use member, i.e., by using the light guide of an optical unit as the mold goods which

ist of a Magnesium alloy Since closing in also has high reinforcement as compared with the mold goods which can n lightweight-ization and consist of resin, by the thinning, an optical unit can be lightweight-ized and heat ipation nature and cooling effectiveness can be raised. Furthermore, the mold goods which consist of a Magnesium y can maintain the precision stabilized since shock resistance and vibratility-proof were high as compared with the d goods which consist of resin, and failure cannot break out easily. And since there is almost no degradation of the ity of the material unlike the mold goods which consist of resin, the mold goods which consist of a Magnesium y are reliable, and can be recycled. Moreover, the bad influence by the powerful noise irradiated from a lamp and the e of the leading-about line of the upstream of a power source and a circuit can be shielded, and the dependability of [ can be raised.

[6] the case where it constitutes from mold goods with which a sheathing case also consists of a Magnesium alloy cially -- the equipment whole -- much more -- lightweight-izing -- while being able to miniaturize, it will have the tion of the heat sink of an optical unit, generation of heat of optical elements is suppressed, and the improvement in endability or an illuminance rise is enabled. Furthermore, since the dependence to a cooling fan can be suppressed, it ributes to small [ of the body by a fan's miniaturization and reduction of the number of installation ], and thin shape-on, in addition low noise-ization by the activity of the oscillating absorptivity of magnesium and reduction of a fan tional frequency also becomes possible. Moreover, since the sheathing case was constituted from mold goods which sist of a Magnesium alloy, the reduction of components which has a shielding function can do the chassis which ches and shields an audio substrate, the shielding plate of a power supply unit, etc., and lightweight-izing and a cost can also be aimed at.

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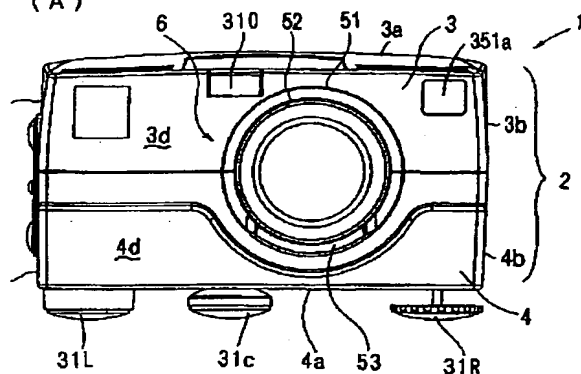
\*\* shows the word which can not be translated.

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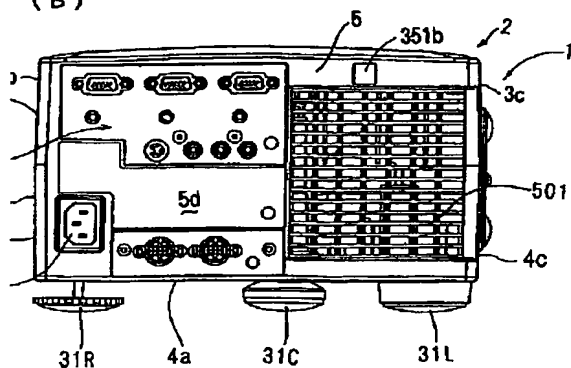
## AWINGS

awing 1]

(A)



(B)



awing 2]

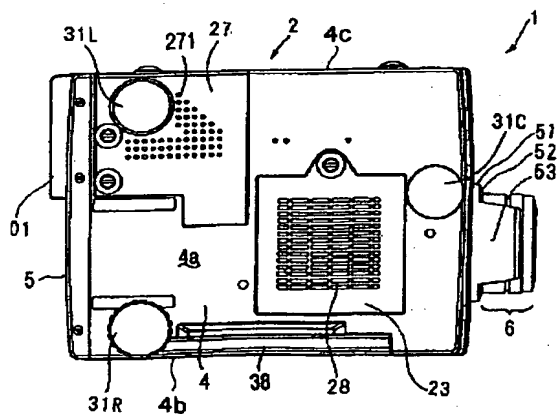
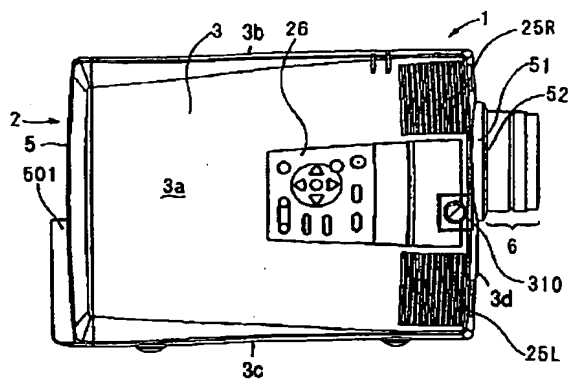


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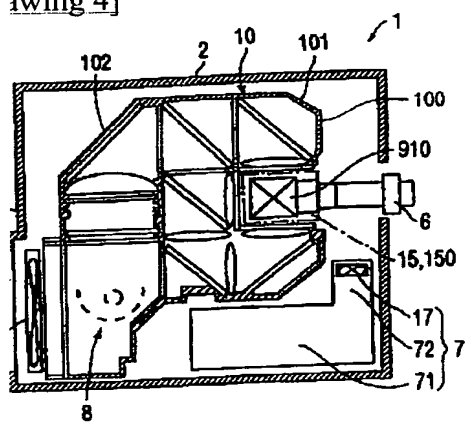


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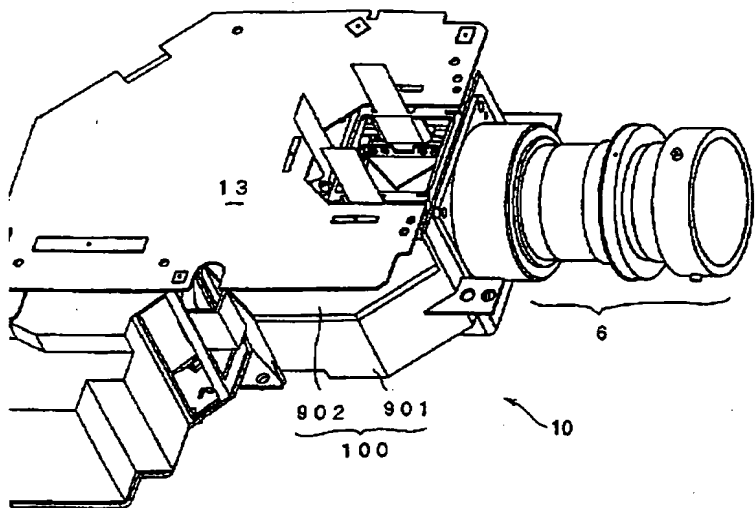


Figure 3

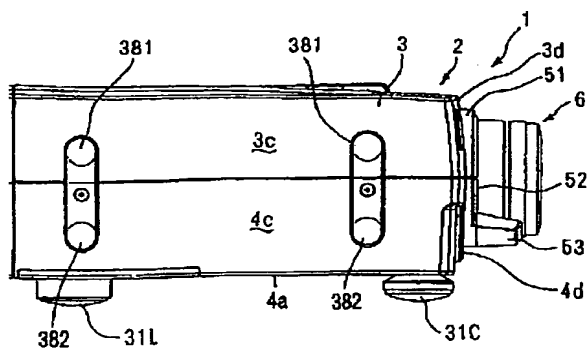
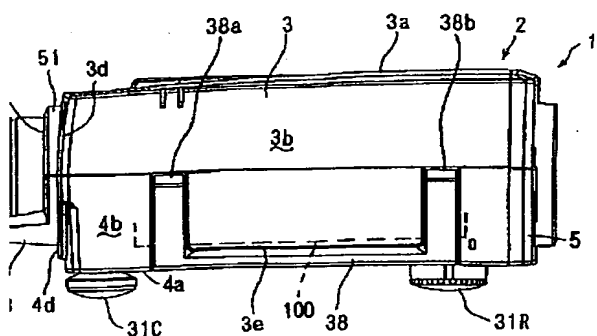
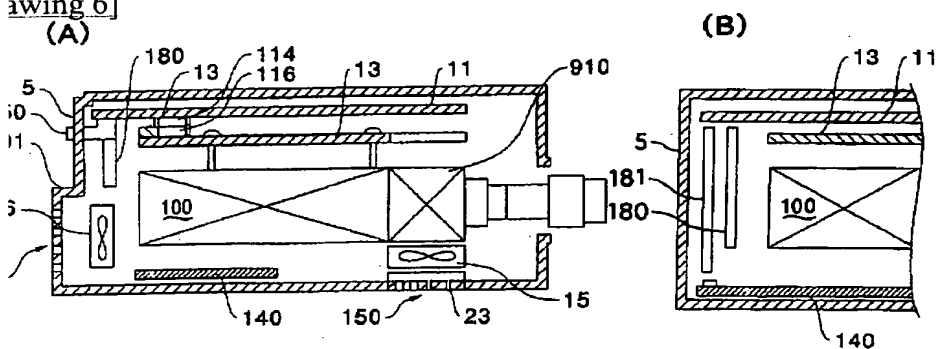
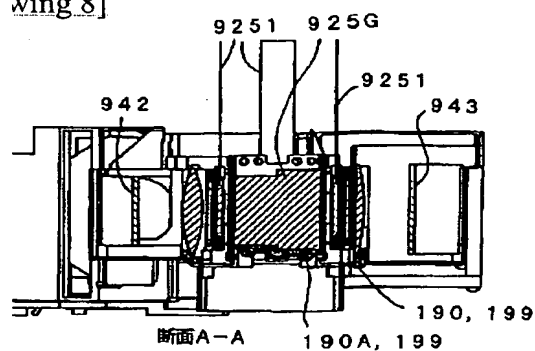


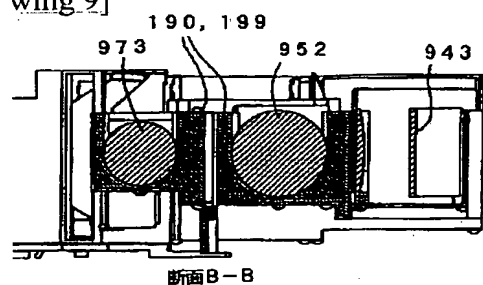
Figure 6



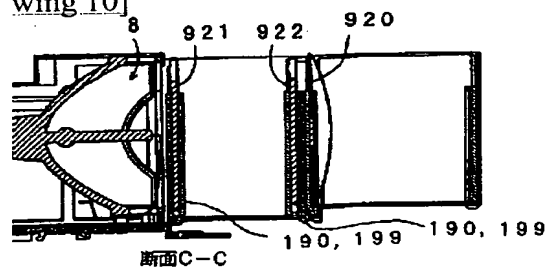
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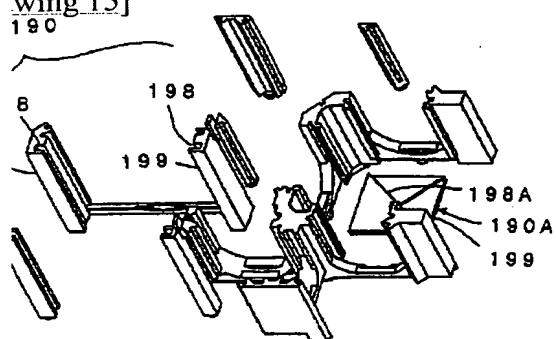
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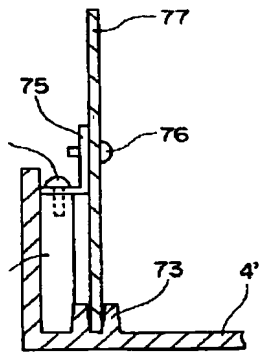
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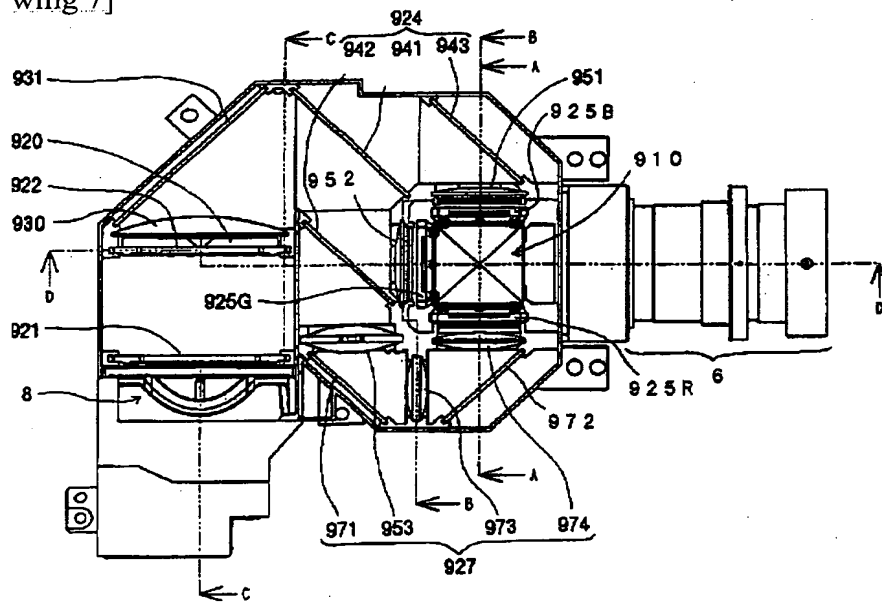
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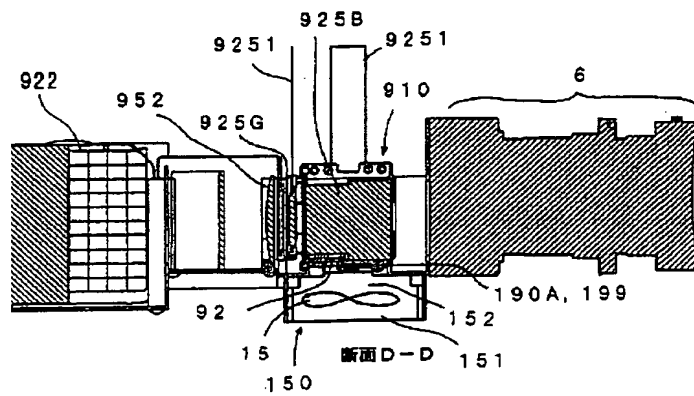
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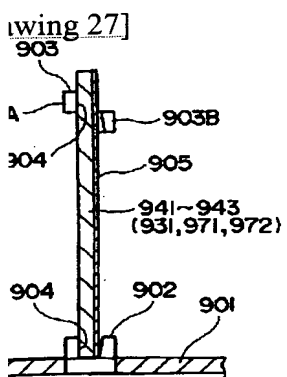
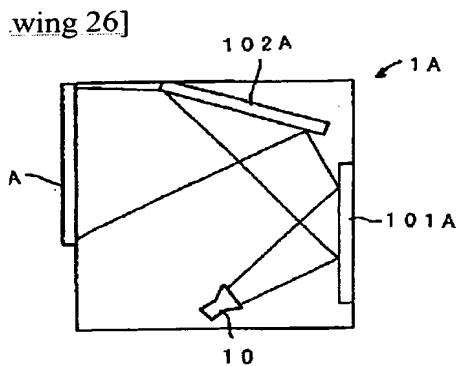
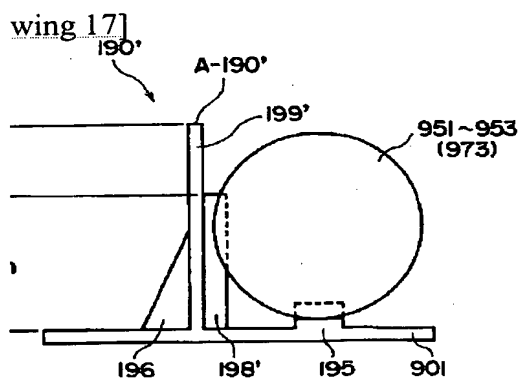
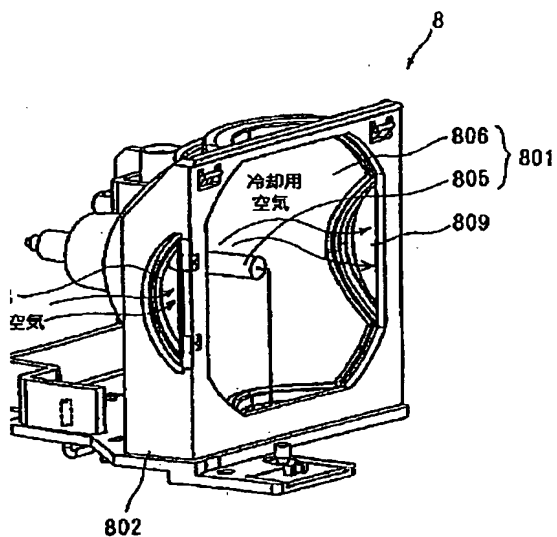
[wing 7]



[wing 11]

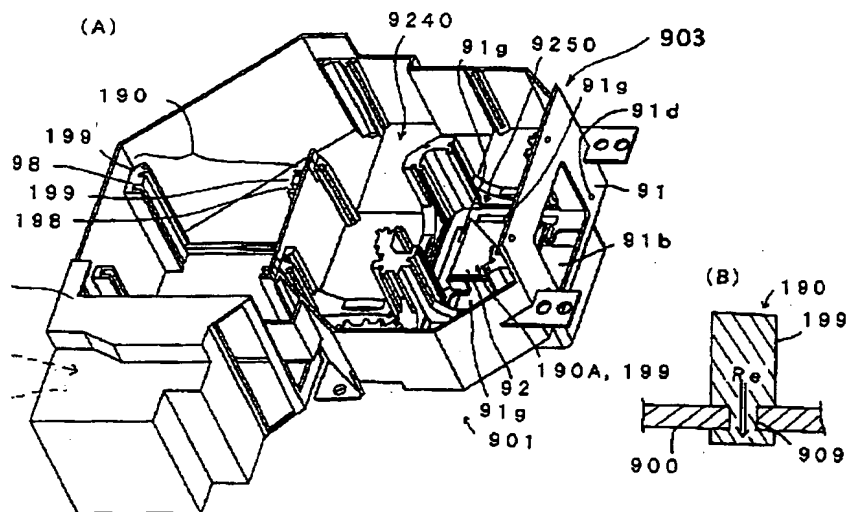


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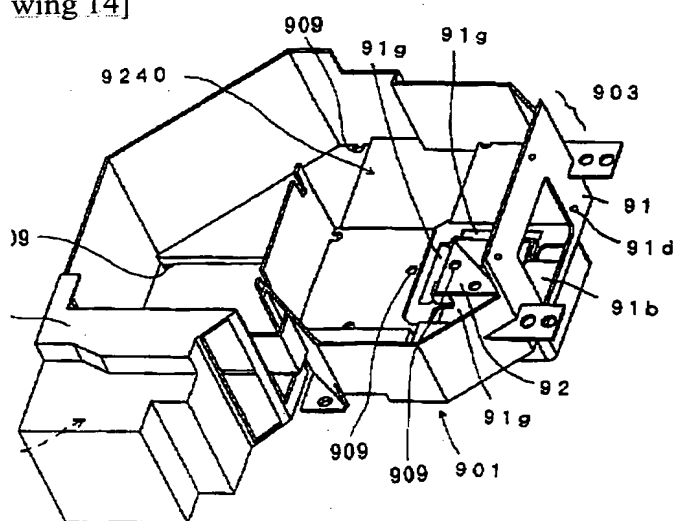


wing 13]

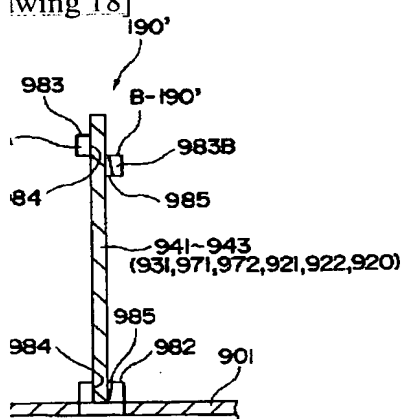




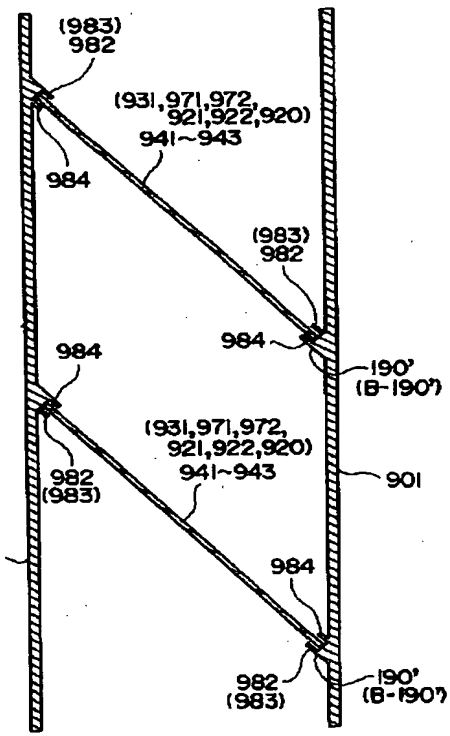
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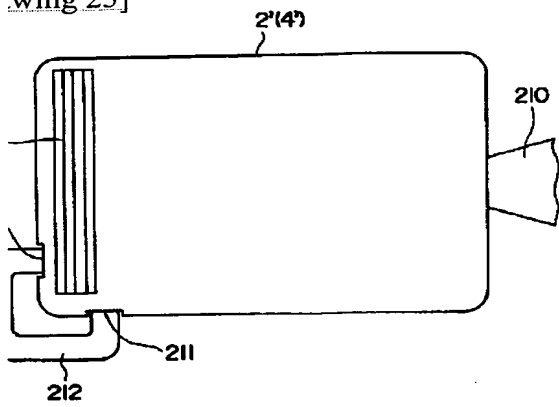
[wing 18]



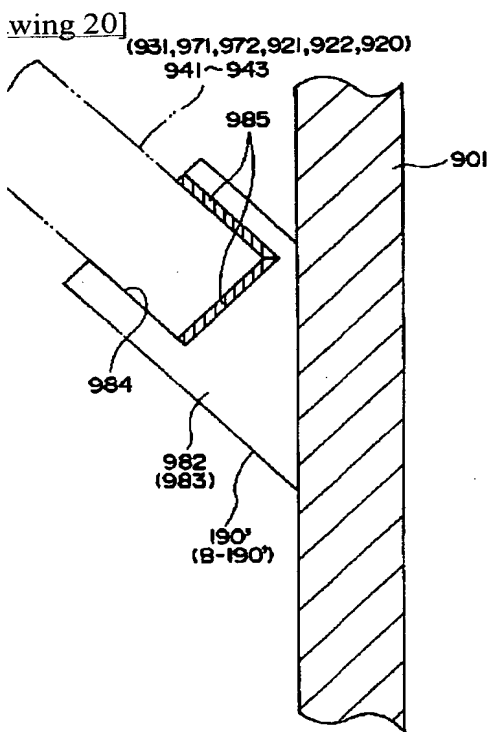
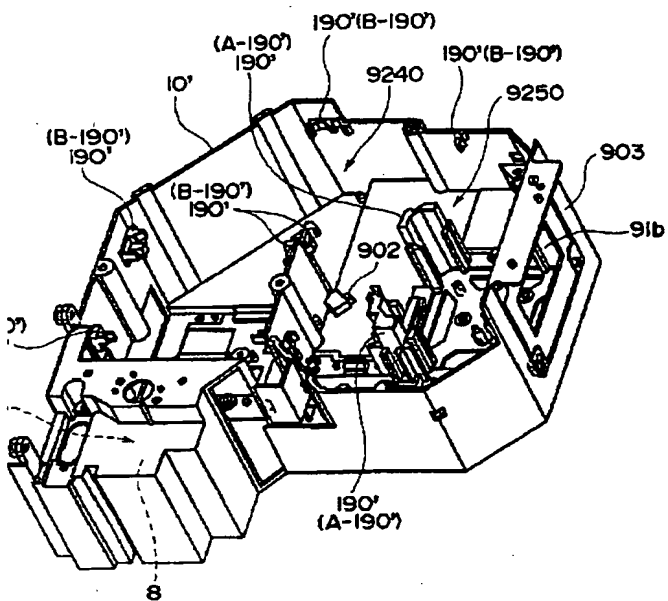
[wing 19]



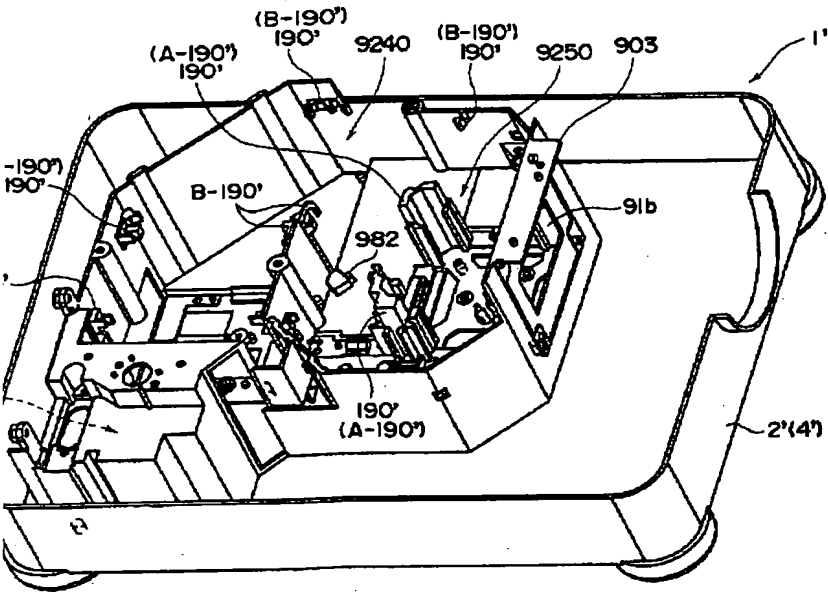
[wing 23]



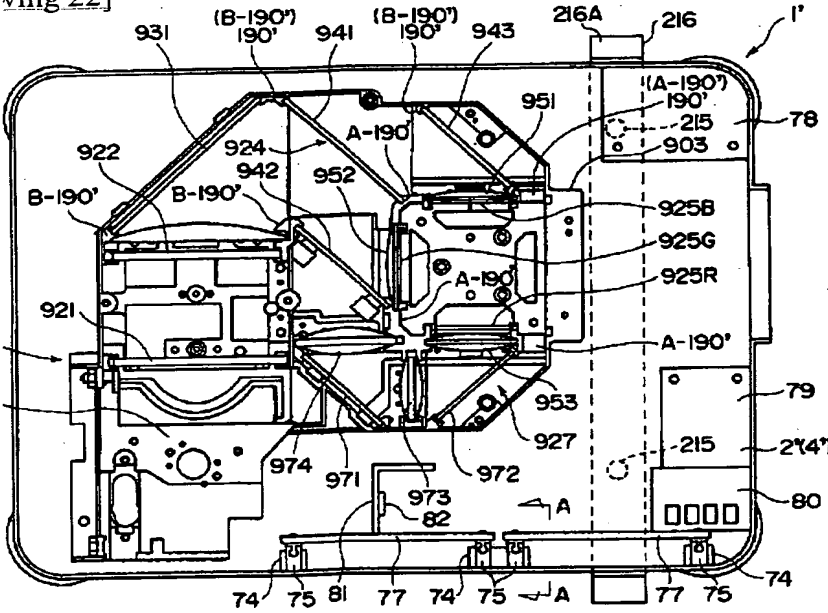
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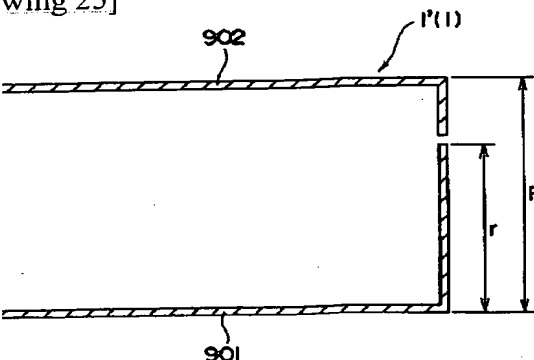
wing 21]



wing 22]



wing 25]



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